USE OF FINGER BOWLS.

AN OBJECTIONABLE CUSTOM AS SOMETIMES PRACTICED.

A Note by C. H. LAVINDER, Surgeon, United States Public Health Service.

A recent bulletin of the service (Public Health Bulletin No. 57) reviews the subjects of common drinking cups and roller towels, and gives the laws relating thereto. Neither in this bulletin nor elsewhere have I ever seen any reference to an abuse which it seems to me is of little less importance than the common drinking cup, and the dangers from which are of quite a similar character. This is the use of the common finger bowl.

It seems to be customary even in high-class restaurants to have in use about half a dozen finger bowls, more or less, and these do service for many patrons. The water in them seems to be changed at rare intervals and entirely in the discretion of the waiter. Occasionally one will see the old water poured out and fresh poured in, but far more frequently even this is not done. I presume the bowls must be taken out and washed occasionally. Now, when one considers that many persons in using these bowls wash not only their fingers but their lips as well, it would seem that the conditions of the common drinking cup are different only in degree. Moreover with the finger bowl it is not only the question of using a common bowl but often common water also.

Since I first noticed in some hotels and restaurants this disgusting manner of serving these convenient accessories of a table service, I have taken some pains to learn how widespread such a thing might be, and my observations lead me to the belief that it is very common indeed. I am inclined to think that the common finger bowl should be classed with the common drinking cup, as an offense of the same character, but possibly less in degree.

HOOKWORM DISEASE.

PROPORTION OF MALES TO FEMALES IN THE AMERICAN HOOKWORM (NECATOR AMERICANUS), BASED ON 13,080 WORMS FROM 102 CASES.[1]

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The point was raised by Leichtenstern in 1885 that by counting the male and female hookworms passed by a patient and drawing the proportion, the clinician has a practical clue to the completeness or incompleteness of the cure effected. This point was based upon the premises that the males and the females are present in relatively fairly constant proportion and that the males are more difficult to expel than are the females.

[1] Read at the XV International Congress on Hygiene and Demography, Washington, September, 1912.

This view of Leichtenstern, based upon the Old World hookworm (*Ancylostoma duodenale*), appears to be one that might in certain cases be of practical importance, and it seemed wise, therefore, to test it as applied to our American hookworm.

The opinion seems to prevail that in case of *Ancylostoma duodenale* the female worms are much more numerous than the males. Bearing on this point the following data are found in our notes (absence from library facilities at present prevents us from consulting some of the original articles):

Bilharz (1853, 55), Heller (1876b, 778), and R. Blanchard (1888a, 765) report 1 male to 3 females. White (1867, 427) states that the males are less numerous than the females. The following cases are reported with the number of males and females passed:

Number of—				Author.
Cases.	Worms.	Males.	Females.	
1	169	38	131	Leichtenstern, 1885, 501.
1	45	10	35	Do.
1	306	83	223	Do.
1	695	235	460	Leichtenstern, 1885, 501, Schumacher's case.
1	142	0	142	Leichtenstern, 1886, 217, Schulthess's case.
1	647	188	459	Do.
1	64	13	51	Do.
1	250	0	250	Do.
1	153	1	152	Do.
1	135	20	115	Do.
1	230	8	222	Do.
11	2,836	596	2,240	

In the foregoing 11 cases it is clear that the females (78 per cent) are in excess of the males (21 per cent). In 7 cases from Schulthess the females and males were about 6 to 1.

Leichtenstern (1886, 216–217) quotes two series of cases from Schulthess, as follows:

Number of—			
Cases.	Worms.	Males.	Females.
26	6,134	1,811	4,323
(?)	4,111	1,367	2,744
26+	10,245	3,178 31 per cent.	7,067 68 per cent.

In these two series also it is clear that the females (68 per cent) are in excess of the males (31 per cent). In the series of 26 cases the variation was between 10 males to 360 females and 10 males to 11 females.

Leichtenstern remarks that the males may roll themselves up in the feces and be overlooked. He also states that cases occur in

which only the females appear for two days after the anthelmintic; then the males appear.

From the foregoing statistics, based upon *Ancylostoma duodenale*, we were prepared to find similar conditions in the case of *Necator americanus*, especially since Lutz (who probably had *Necator* before him) is quoted as reporting for 3,000 worms a proportion of 3 females to 2 males.

In hospital work we usually have hookworm patients under observation only one day per week. It becomes necessary to inquire, therefore, into the number and proportion of worms passed in successive stools and on successive days in order to have an indication of the proportion of worms that escape collection on the day of treatment.

Number of worms and proportion of sexes found in successive stools on day of thymol treatment.—The stools may follow each other so slowly or so rapidly, namely, so ununiformly, that a tabulation by actual stools has been followed in only a very few instances.

Case No. 3 (age 21 years) of our 1911 series shows the following data on day of treatment; dose, 45 grains of thymol:

Stool.	Males.	Females.	Total.
First	29	4	33
Second	(?)	(?)	61
Third	0	1	1
Total, 3	29+	5+	95

Although in the second stool the males and the females were not separated, it is clear that in the first stool the males were greatly in excess of the females, and therefore that they were not more difficult to expel.

Case No. 63 (age 16) of our 1911 series shows the following data on first treatment; dose, 10 grains of thymol. (The patient had received one treatment before he came to the marine hospital.)

Date and number of stool.	Males.		Females.		Total worms.	Per cent of 347.
	Number.	Per cent.	Number.	Per cent.		
Aug. 4:						
First	1	50	1	50	2	0.57
Second	50	39.6	76	60.3	126	36.3
Third	48	44	61	55	109	31.4
Fourth	18	60	12	40	30	8.6
Fifth	21	36.8	36	63	57	16.4
Aug. 5:						
Sixth	13	68	6	31	19	5.4
Seventh	2	50	2	50	4	1.1
Total	153	44	194	55	347	100.00

In this treatment it is clear (*a*) that the female worms were in excess of the males for the total treatment (7 stools) and for stools Nos. 2, 3, and 5; (*b*) that the males and females were equal in stools Nos. 1 and 7; and (*c*) that the males were in excess in stools Nos. 4 and 6.

The two cases cited do not seem to give us any clue of practical value in use of statistical data as to sexes in their order of expulsion in a given treatment.

In our notes we find two literature references for comparison. E. Parona, according to R. Blanchard (1888a, 765) reports a case as follows: First stool contained 8 males and 104 females, total 112 worms; second stool contained 16 males and 19 females, total 35 worms; third stool contained 107 males and 66 females, total 173 worms.

Blanchard (1888a, 765) also reports a case from Leichtenstern as follows: First stool contained 10 males and 124 females, total 134 worms; second stool contained 28 males and 7 females, total 35 worms.

It is not clear to us whether Parona's case involved 3 courses of treatment or 3 stools after 1 course of treatment, but our notes give the following data for Leichtenstern's (1885, 101) case: First treatment, 15 extr. fil. mar.,[1] first 4 days; 10 males and 124 females, total 134 worms. Second treatment, 10 extr. fil. mar.,[1] 28 males and 7 females, total 35 worms. Total, 38 males and 131 females. Grand total, 169 worms.

Accordingly, positive data for comparison between *Necator americanus* and *Ancylostoma duodenale*, in respect to the point under discussion, are not available to us at present.

Duration of passage of worms after thymol.—In hospital work the average hookworm patient is, as stated above, usually under observation for only about 18 to 24 hours at a time. He is admitted to the wards late in the afternoon or early in the evening. He takes his thymol the next morning. By 1 to 4 o'clock in the afternoon he is over the effects of the salts and thymol to such an extent that he either desires to go home or from a financial (administrative) point of view there is little or no justification in retaining him longer. Accordingly, under ordinary circumstances, opportunity is presented to collect the worms passed only up to 3 or 5 p. m. of the day of treatment. While this permits, doubtless, the collection of most of the worms, a number escape the observer, for they continue to pass for three or four days or more, as the following cases show.

[1] German equivalent for Oleoresina aspidii of the United States pharmacopœia.

CASE NO. 63.

Date.	Thymol.	Worms.				Total.	Per cent of total of each treatment.
		Male.		Female.			
		Number.	Per cent.	Number.	Per cent.		
	Grains.						
Aug. 4	10	138	42.5	186	57.5	324	86
Aug. 5	0	15	65.2	8	34.8	23	6
Aug. 6	0	6	22.2	21	77.8	27	7.2
Total	10	159	42.5	215	57.5	374	.....
Aug. 8	10	1	25	3	75	4	80
Aug. 9	0	0	0	1	100	1	20
Aug. 10	0	0	0	0	0	0	0
Total	10	1	20	4	80	5	.....

CASE NO. 179.

Date.	Thymol.	Worms.				Total.	Per cent of total of each treatment.
		Male.		Female.			
		No.	Per cent.	No.	Per cent.		
	Grains.						
July 3	15	19	43.1	25	56	44	95.6 per cent of 46.
July 4	0	0	0	1	100	1	2.2 per cent of 46.
July 5	0	0	0	0	0	0	
July 6	0	0	0	0	0	0	
July 7	0	0	0	0	0	0	
July 8	0	0	0	1	100	1	2.2 per cent of 46.
Total	15	19	41.3	27	58.7	46	
July 21	25	29	41	41	58	70	77.8 per cent of 90.
July 22	0	4	100	0	0	4	4.4 per cent of 90.
July 23	0	4	50	4	50	8	8.9 per cent of 90.
July 24	0	0	0	1	100	1	1.1 per cent of 90.
July 25	0	3	50	3	50	6	6.7 per cent of 90.
July 26	0	0	0	1	100	1	1.1 per cent of 90.
Total	25	40	44.4	50	55.6	90	
July 27	30	5	22.7	17	77.3	22	73.3 per cent of 30.
July 28	0	0	0	0	0	0	
July 29	0	0	0	2	100	2	6.7 per cent of 30.
July 30	0	1	25	3	75	4	13.3 per cent of 30.
July 31	0	0	0	0	0	0	
Aug. 1	0	0	0	0	0	0	
Aug. 2	0	1	50	1	50	2	6.7 per cent of 30.
Total	30	7	23.3	23	76.7	30	
Aug. 3	30	6	35.3	11	64.7	17	100 per cent of 17.
Aug. 4	0	0	0	0	0	0	
Total	30	6	35.3	11	64.7	17	

CASE NO. 200.

Date.	Thymol.	Worms.					Per cent of total of each treatment.
		Males.		Females.		Total.	
		Number.	Per cent.	Number.	Per cent.		
	Grains.						
Aug. 12	45	275	46.8	312	53.1	587	96.2
Aug. 13	0	0	.....	0	.....	0	.....
Aug. 14	0	7	53.8	6	46.1	13	2.1
Aug. 15	0	3	30	7	70	10	1.6
Aug. 16	0	0	.....	0	.....	0	.....
Total	45	285	46.7	325	53.2	610	100
Aug. 17	45	48	52.7	43	47.2	91	96.8
Aug. 18	0	0	.....	0	.....	0	.....
Aug. 19	0	1	33.3	2	66.2	3	3.1
Aug. 20	0	0	.....	0	.....	0	.....
Aug. 21	0	0	.....	0	.....	0	.....
Total	45	49	52.1	45	47.8	94	100
Aug. 22	45	10	47.6	11	52.3	21	77.7
Aug. 23	0	0	.....	0	.....	0	.....
Aug. 24	0	5	83.3	1	16.6	6	22.2
Total	45	15	55.5	12	44.4	27	100
Aug. 25	45	0	.....	2	100	2	100

From the foregoing cases it is clear that all worms expelled by a given course of treatment need not necessarily be passed on the day of treatment, but while about 75 to 95 per cent of the specimens expelled may be passed within 12 hours after the drug is administered, worms may continue to pass for 5 or 6 days.

It further seems evident from the foregoing records that the males and females do not follow any regular order in passing which can be used as a practical indication as to the completeness or incompleteness of the cure.

Two practical conclusions are to be drawn from the foregoing data.

(1) Since 75 to 95 per cent of the worms pass during the first 12 hours after administration, all hospital records that give the number of worms collected during this period are subject to a theoretical error of about 5 to 33 per cent; that is to say, the actual number of worms passed may be from one-twentieth up to one-third larger than actually reported. This point should be borne in mind when comparing statistics derived from treatment with statistics derived from autopsy not preceded by treatment.

(2) It occasionally occurs that on the day of treatment not a single worm is collected, but later microscopic examination is negative. Probably the correct conclusion is that the worms have been passed after the patient has been discharged.

Proportion of male and female hookworms passed after thymol treatment.—In nearly all of the following cases the worms were collected

within 12 hours (namely, by 6 p. m.) after the first dose of thymol (which is given at 6 a. m.).

Two groups of cases, each with three subgroups, may be compared.

In the first group are found 58 cured male cases, arranged in three subgroups according to the preponderance of male worms, equal number of males and females, and preponderance of female worms.

Of these 58 patients, 18 cases (or 31 per cent) showed more male (59 per cent) than female (40 per cent) hookworms; 5 cases (8 per cent) have an equal number of male and female worms; 35 cases (60 per cent) have an excess of females. Thus, on a basis of these cases, the chances are about 6 out of 10 that there will be an excess of females, but this percentage is not high enough to put to any practical account in determining, by counting the males and females collected, whether or not the patient is entirely freed from his worms. In fact, the labor involved would be much greater, more tedious, and more disagreeable than the labor involved in making a new microscopic examination a few days later.

The 18 cases with an excess of males showed 1,378 worms, 821 of which (or 59 per cent) were males, and 557 of which (or 40 per cent) were females.

The 5 cases with equal number of male and female worms were all light infections, averaging only 11.6 worms each.

The 35 cases with more females than males showed 6,524 [1] worms, 2,797 of which (or 43 per cent) were males, and 3,727 of which (or 57 per cent) were females.

Of the total 7,960 [1] worms collected from the 58 cases, 3,647 specimens (or 45 per cent) were males, and 4,313 specimens (or 54 per cent) were females.

In respect to number of worms present, the cases with equal males and females averaged the smallest number of worms (11), those with an excess of males came next (76), and those with an excess of females came next (186). The average was 137 worms. Thus, in general, the heaviest infections were those with the largest number of females, but this is not of much significance since only 9 of the 35 female-excess cases were above the average (139) in number of worms present, while 2 of the 18 male-excess cases were above the average.

The "cured" [2] cases are given in the following table.

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[1] Plus 26 worms, the sex of which was not determined.

[2] "Cured" means that later microscopic examination was negative.

Tabulation of 58 cured male hospital cases according to total number of worms and preponderance of sex of parasites.

A. EIGHTEEN CASES WITH EXCESS OF MALES.

Case No.	Worms.			Case No.	Worms.		
	Total.	Males.	Females.		Total.	Males.	Females.
111	474	277	197	31	37	21	16
26	143	74	69	55	9	6	3
163	138	82	56	139	8	5	3
11	111	65	46	58	7	6	1
144	97	58	39	92	7	4	3
29	95	68	27	73	6	4	2
66	72	37	35	15	1	1	0
67	68	36	32	125	1	1	0
103	62	45	17				
165	42	31	11	Total (18)	1,378	[1] 821	[2] 557

B. FIVE CASES WITH EQUAL MALES AND FEMALES.

42	44	22	22	62	2	1	1
53	6	3	3				
170	4	2	2	Total (5)	58	[3] 29	[3] 29
169	2	1	1				

C. 35 CASES WITH EXCESS OF FEMALES.

78	2,251	1,049	1,202	80	17	4	13
110	1,142	564	578	75	14	5	9
63	633	234	399	52	11	5	6
39	538	254	284	87	8	3	5
24	506	173	333	90	7	3	4
23	295	99	196	108	7	3	4
27	170	77	93	109	6	2	4
41	167	52	115	93	5	1	4
119	150	43	107	13	4	1	3
44	113	55	58	7	3	0	3
83	92	16	76	89	3	0	3
34	80	35	45	172	2	0	2
56	73	27	46	153	2	0	2
21	72	32	40	91	1	0	1
92	58	24	34	140	1	0	1
32	28	11	17	88	1	0	1
70	24	9	15				
157	21	10	11	Total (35)	[4] 6,524	[5] 2,797	[6] 3,727
74	19	6	13				

[1] 59 per cent.
[2] 40 per cent.
[3] 50 per cent.
[4] Plus 26, sex not counted.
[5] 43 per cent.
[6] 57 per cent.

D. SUMMARY OF 58 CURED CASES.

	Cases.	Total.	Worms.	
			Males.	Females.
A	18	1,378	821	557
B	5	58	29	29
C	35	[1] 6,524	2,797	3,727
Total	58	[1] 7,960	[2] 3,647	[3] 4,313

[1] Plus 26, sex of which was not determined.
[2] 45 per cent.
[3] 54 per cent.

For comparison with these 58 complete cures, 44 male hospital cases can be presented in connection with which it is either definitely known that later microscopic examination (in 1911) was positive

(hence the cure was incomplete), or through failure to obtain specimens the completeness or incompleteness of the cure was left in doubt.

Of these 44 cases, 19 patients (or 43 per cent) showed an excess of males; there was a total of 2,738 worms, 1,468 of which (or 53 per cent) were males and 1,270 of which (or 46 per cent) were females. These percentages are not very different from those of the corresponding cured cases.

Of the 44 cases, 4 patients (or 9 per cent) showed an equal number of males and females. All were light infections, averaging only 10.5 worms each.

Of the 44 cases, 21 patients (or 47 per cent) showed an excess of females; of a total of 2,340 worms, 1,001 specimens (or 42 per cent) were males, and 1,339 specimens (or 57 per cent) were females.

The cases in question are tabulated as follows:

Tabulation of 44 male hospital cases, some with incomplete cure, some without final data as to cure, arranged according to total number of worms and preponderance of sex of parasites.

A. NINETEEN CASES WITH EXCESS OF MALES.

Case No.	Worms.			Case No.	Worms.		
	Total.	Male.	Female.		Total.	Male.	Female.
85	710	387	323	20	11	6	5
57	695	353	342	46	10	7	3
94	366	188	178	65	9	5	4
69	315	163	152	115	7	4	3
141	172	89	83	95	5	5	0
12	158	82	76	79	5	3	2
9	85	60	25	97	5	3	2
47	70	39	31	145	3	3	0
88	58	31	27				
3	34	29	5	Total (19)	2,738	[1] 1,468	[2] 1,270
143	20	11	9				

B. FOUR CASES WITH EQUAL MALES AND FEMALES.

158	18	9	9	104	4	2	2
74	10	5	5				
118	10	5	5	Total (4)	42	[3] 21	[3] 21

C. TWENTY-ONE CASES WITH EXCESS OF FEMALES.

68	366	158	208	72	16	7	9
30	347	163	184	35	15	5	10
45	315	128	187	126	9	3	6
10	257	109	148	33	7	3	4
99	256	125	131	136	5	0	5
117	199	91	108	105	4	0	4
16	170	62	108	137	4	1	3
2	113	39	74	6	4	1	3
1	93	43	50	154	3	0	3
71	86	40	46				
5	39	13	26	Total (21)	2,340	[4] 1,001	[5] 1,339
116	32	10	22				

[1] 53 per cent.
[2] 46 per cent.
[3] 50 per cent.
[4] 42 per cent.
[5] 57 per cent.

Tabulation of 44 male hospital cases, some with incomplete cure, some without final data as to cure, arranged according to total number of worms and preponderance of sex of parasites—Continued.

D. SUMMARY.

	Cases.	Worms.		
		Total.	Male.	Female.
A	19	2,738	1,468	1,270
B	4	42	21	21
C	21	2,340	1,001	1,339
Total	44	5,120	[1] 2,490	[2] 2,630

[1] 48 per cent. [2] 51 per cent.

Comparing these statistics with the sex statistics of the cured cases, it is not evident that the proportion of the sexes gives us any practical clue to the question whether our patient is or is not cured.

Combining the two sets of statistics we have the following table:

Table of worms, by sex, in 102 cases.

	Cases.	Total.	Male.		Female.		Average per case.
			Number.	Per cent.	Number.	Per cent.	
Cured	58	[1] 7,960	3,647	46	4,313	53	137
Others	44	5,120	2,490	48	2,630	51	116
Total	102	[1] 13,080	6,137	46	6,943	53	128

[1] Plus 26 worms, sex of which was not determined.

Proportion of male and of female worms passed in different treatments of 58 cases.—The following 58 cases of complete cures give data as to sex of parasites passed in successive treatments:

A. FORTY-THREE CASES CURED IN ONE TREATMENT.

Case No.	Age.	Thymol.	Worms collected.				
			Total.	Males.		Females.	
				Number.	Per cent.	Number.	Per cent.
		Grains.					
134	14	25	0	0	0	0	0
70	24	60	24	9	37	15	62
144	37	60	97	58	59	39	40
119	14	20	150	43	28	107	73
7	16	30	3	0	0	3	100
41	23	60	167	52	31	115	68
165	8	10	42	31	73	11	26
91	10	20	1	0	0	1	100
74	10	20	19	6	31	13	68
93	7	15	5	1	20	4	80
140	13	25	1	0	0	1	100
139	30	60	8	5	62	3	37
21	20	45	72	32	44	40	55
13	14	30	4	1	25	3	75
90	12	30	7	3	42	4	57

A. FORTY-THREE CASES CURED IN ONE TREATMENT—Continued.

Case No.	Age.	Thymol.	Worms collected.				
			Total.	Males.		Females.	
				Number.	Per cent.	Number.	Per cent.
		Grains.					
58	20	50	7	6	85	1	15
157	12	25	21	10	47	11	52
31	19	45	37	21	57	16	43
55	14	25	9	6	66	3	33
92	36	50	58	24	41	34	58
42	25	45	44	22	50	22	50
73	26	42.5	6	4	66	2	33
170	11	25	4	2	50	2	50
169	11	25	2	1	50	1	50
125	13	25	1	1	100	0	0
109	12	25	6	2	33	4	66
92	9	20	7	4	57	3	42
88	5	7.5	1	0	0	1	100
53	60	50	6	3	50	3	50
87	33	50	8	3	37	5	62
172	7	15	2	0	0	2	100
29	21	60	95	68	71	27	28
163	13	20	138	82	59	56	40
80	31	60	17	4	23	13	76
153	9	20	2	0	0	2	100
89	9	20	3	0	0	3	100
108	14	30	7	3	42	4	57
32	38	60	28	11	39	17	60
56	16	20	73	27	37	46	63
62	11	15	2	1	50	1	50
52	20	45	11	5	45	6	54
34	29	60	80	35	43	45	56
26	21	60	143	74	51	69	48
Total		1,485	1,418	660	46	758	53

B. SIX CASES CURED IN TWO TREATMENTS.

75	5	10	13	4	30	9	69
		10	1	1	100	0	0
Total		20	14	5	35	9	64
67	12	20	63	34	54	29	46
		20	5	2	40	3	60
Total		40	68	36	53	32	47
11	13	20	97	59	60	38	39
		25	14	6	42	8	57
Total		45	111	65	58	46	41
110	15	25	1,094	539	49	555	50
		25	48	25	52	23	47
Total		50	1,142	564	49	578	51
83	18	50	83	16	19	67	80
		50	9	0	0	9	100
Total		100	92	16	17	76	82
15	27	60	1	1	100	0	0
		60	0	0	0	0	0
Total		120	1	1	100	0	0
Aggregate (6)		375	1,428	687	48	741	51

C. SIX CASES CURED IN THREE TREATMENTS.

103	6	7.5	23	17	73	6	26
		10	20	15	75	5	25
		10	19	13	68	6	31
Total		27.5	62	45	72	17	27

C. SIX CASES CURED IN THREE TREATMENTS—Continued.

Case No.	Age.	Thymol.	Worms collected.				
			Total.	Males.		Females.	
				Number.	Per cent.	Number.	Per cent.
		Grains.					
111	10	20	449	266	59	183	40
		20	22	11	50	11	50
		20	3	0	0	3	100
Total		60	474	277	58	197	41
44	12	10	113	55	48	58	51
		10	0	0	0	0	0
		20	0	0	0	0	0
Total		40	113	55	48	58	51
27	13	20	122	56	45	66	54
		20	25	12	48	13	52
		30	23	9	39	14	60
Total		70	170	77	45	93	54
66	14	20	54	28	51	26	48
		20	8	4	50	4	50
		25	10	5	50	5	50
Total		65	72	37	51	35	48
39	16	20	369	183	49	186	50
		25	162	68	41	94	58
		30	7	3	42	4	59
Total		75	538	254	47	284	52
Aggregate (6)		337.5	1,429	745	52	684	47

D. ONE CASE CURED IN FOUR TREATMENTS.

78	17	25	2,246	1,048	46	1,198	53
		25	26	(?)	(?)	(?)	(?)
		25	2	1	50	1	50
		25	3	0	0	3	100
Total		100	2,277	1,049+	47	1,202+	53

E. ONE CASE CURED IN FIVE TREATMENTS.

23	10	12	54	40	74	14	25
		15	11	5	45	6	54
		12.5	218	52	23	166	76
		15	1	1	100	0	0
		20	11	1	9	10	90
Total		74.5	295	99	33	196	66

F. TWO CASES CURED IN SEVEN TREATMENTS.

24	12	20	109	49	44	60	55
		20	267	91	34	176	65
		20	53	15	28	38	71
		25	24	6	25	18	75
		25	36	10	27	26	72
		25	8	2	25	6	75
		25	9	0	0	9	100
Total		160	506	173	34	333	65
63	16	10	374	159	42	215	57
		15	5	1	20	4	80
		25	218	67	30	151	69
		15	0	0	0	0	0
		25	15	2	13	13	86
		30	19	4	21	15	78
		30	2	1	50	1	50
Total		150	633	234	36	399	63
Aggregate (2)		310	1,139	407	35	732	64

Tabulating the summaries according to the number of treatments, we obtain the following:

	Cases.	Treatments to cure.	Worms.				
			Total.	Males.		Females.	
				Number.	Per cent.	Number.	Per cent.
A	43	1	1,418	660	46	758	53
B	6	2	1,428	687	48	741	51
C	5	3	1,429	745	52	684	47
D	1	4	[2] 2,251	1,049+	46	1,202+	53
E	1	5	295	99	33	196	66
F	2	7	1,139	407	35	732	64
Total	[1] 59	96	[2] 7,960	3,647+	46	4,313	53

[1] The 58 cases given on p. 14, plus 1 case, in which worms were not found in the stools.
[2] Plus 26, sex of which was not determined.

From these tables it is not evident that the greater the percentage either of males or of females the greater the number of treatments necessary. Accordingly, it is not evident that there is any striking difference in difficulty in expelling males or females, so far as the number of treatments is concerned.

SUMMARY.—In view of the statements published in reference to the proportion of the sexes in *Ancylostoma duodenale*, a study of the statistics in 102 cases of infection with *Necator americanus* is distinctly disappointing, and the conclusion seems justified that whatever may be the practical value of estimating the sexes of *A. duodenale*, from a standpoint of obtaining a clue as to whether or not the cure is complete, this method of procedure, as applied to the average hospital case of *N. americanus*, does not appear to present any practical advantage. In fact, the method is much more tedious, more time consuming, and less reliable than our present method of microscopic examination, and therefore its adoption in our hookworm-eradication campaign is not to be recommended.

As a purely academic matter, it is interesting to note that of 13,080 specimens of *Necator americanus* collected from 102 cases 46 per cent of the specimens were males and 53 per cent were females; but the proportion for different cases varied, some cases presenting more males than females, others more females than males.

Of 102 cases examined 37 presented an excess of males, 9 presented an equal number of males and females, and 56 presented an excess of females.

In 58 cured cases in New Hanover County, N. C., the greatest number of worms collected from any one case was 2,277; the smallest number 1; the average number 135.

About 75 to 95 per cent of the worms of a given course of treatment may be passed within 12 hours after the early (6 a. m.) dose

of thymol, and worms may continue to pass for several, apparently for at least 6, days following.

From this latter fact the important practical conclusion may be deduced that treatment once per week, as is usual at present, is as frequent as it seems either necessary or wise to give it. Treatment more often than once a week may be entirely unnecessary, even if eggs be found the fifth day after treatment; and since the factor of safety to the patient should be constantly held in mind, thymol treatment oftener than once a week seems justified only in exceptional cases which may present special features or circumstances that indicate the practicability of more frequent dosage.